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Press Release

MELT THE ICE, BUT SAVE THE PLANTS

For Winter/January Timeframe

UNIVERSITY PARK, Pa. -- When removing ice and snow from your walkways this winter, use some precautions to protect your lawn and landscape plantings, says Dr. J. Robert Nuss, professor of ornamental horticulture in Penn State's College of Agricultural Sciences.

"If handled incorrectly, materials used to melt ice and snow can damage lawns, shrubs and ground-cover plants," Nuss says.

The most common material used to melt ice is unrefined rock salt, which is about 98.5 percent sodium chloride -- the same chemical compound used as table salt, rock salt and an ingredient in water softeners.

"This chemical can injure plants if too much is applied," Nuss says. "Sodium can cause soil to become compacted, inhibiting root growth. A high amount of salt will block nutrients needed by plants and absorbs water, causing drought-like conditions. Sodium and chloride ions can be taken up by plants and can injure leaf margins and the tips of new shoots. Salty water splashed on plants can damage buds, twigs and new leaves.

"The Park Maintenance Division of the U.S. Department of Interior considers the maximum safe application per season to be one-half pound of salt per square yard," Nuss advises.

As long as it's used sparingly, garden fertilizer can be a safe alternative for melting ice. In a complete fertilizer, such as 5-10-10, muriate of potash (KCl) is the ice melter. "The superphosphate adds traction," Nuss says.

"Fertilizer is not quite as effective as salt for melting ice, but it is beneficial to plants if applied in about the same quantities recommended for sodium compounds," Nuss says. "Applying too much fertilizer also can harm plants."

Pure nitrogen fertilizer, such as urea, also can be used. It melts ice at temperatures as low as 11 degrees F, and is best applied at temperatures between 25 and 30 degrees. Urea can be applied at a rate of 10 pounds per 100 square feet. For small areas, a mixture of 3 pounds of urea and 100 pounds of sand works well," Nuss says.

Calcium chloride is a more effective ice melter than fertilizer, but it, too, can harm plants. "Mixing calcium chloride with sawdust, however, will keep most of it from leaving the sidewalk in runoff water," Nuss says. "Apply one part calcium chloride to three parts sawdust. This provides traction, and when

warmer weather comes, you can sweep up the mixture and either compost it or dispose of it in the garbage."

Other materials that can be used for traction are gravel, sand, cat litter or cinders.

One more thing -- if you decide to use fertilizer, sawdust or any of these materials that provide traction, keep a sturdy mat at your front door to prevent them from being tracked into your house.

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NebGuide

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Winter Deicing Agents for the Homeowner

Information on deicers and how they affect plants is covered here.

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- Deicing Chemicals
- Chemical Sensitivity on Deciduous Trees
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- Chemical Sensitivity on Coniferous Trees

Slick sidewalks and roads are hazardous. Removing compacted snow and ice with shovels or snow blowers is not always an easy task. Deicers can help by "undercutting," or loosening the snow or ice because they lower the freezing point of water.

Do not use deicers to completely melt snow or ice, but to make their removal easier. Deicers melt down through the ice or snow to the hard surface, then spread out underneath. This undercuts and loosens the snow so shoveling and plowing can be done.

Research has shown that the shape of deicing particles affects the speed of their penetration through ice. Uniformly shaped spherical pellets of about 1/16" to 3/16" penetrate ice faster and more efficiently than other shapes. Irregularly shaped particles tend to melt randomly in all directions. Flakes melt as much horizontally as they do vertically.

There are five chemicals commonly used as deicers. While they can be used alone, they often are blended together or combined with other materials to enhance their performance.

Calcium chloride

Available in flakes, pellets or liquid. Calcium chloride produces an exothermic reaction, giving off heat. Because of this, it often performs better than many other deicing salts, especially at lower temperatures. Some highway departments spray liquid calcium chloride over rock salt to lower its melting temperature.

Sodium chloride

Rock salt first was used as a road deicer in the 1940s. An estimated 10 to 14 million tons will be used yearly on roads in the United States and Canada. Sodium chloride is relatively inexpensive, but it can burn plants and corrode metal and concrete. Sodium chloride is the salt most commonly used to season food.

Potassium chloride

A naturally-occurring material that also is used as a fertilizer (muriate of potash) and food salt substitute, potassium chloride's high salt index has the potential to burn foliage and inhibit rooting.

Urea

Synthesized from ammonia and carbon dioxide, urea is used primarily as a fertilizer. It has a lower burn potential than potassium chloride, and is a source of nitrogen fertilizer. Adjacent turf may green and grow excessively in the spring. If urea remains on top of the soil, it rapidly breaks down to ammonia, which escapes into the air.

Calcium magnesium acetate (CMA)

This is a new salt-free melting agent. It is made from dolomitic limestone and acetic acid (the principal compound of vinegar). CMA is being researched as an alternative to salts for environmentally sensitive areas. The product is being used on bridges sensitive to salt corrosion. Studies have shown the material has little impact on plants and animals.

Concrete paving, such as driveways, walks and steps may be damaged by deicing chemicals. The most common winter damage is scaling, which is caused by cycles of freezing and thawing caused by the deicing agent. Water can be absorbed into the very fine capillary space in the concrete. When it freezes and expands, small flakes of mortar and concrete come loose from the surface.

Concrete also can be damaged by the formation of salt crystals that have a similar effect as water freezing. To prevent freeze-thaw damage (scaling), make sure all concrete-paved surfaces are composed of air-entrained concrete and have proper cement content. Air-entrained concrete has minute air bubbles to increase resilience and resistance to wear. Strength also is important for a durable, scale resistant concrete. The concrete should be correctly cured; new concrete should be air dried for at least 30 days prior to the first freeze. Sealers may be applied to prevent the concrete from absorbing water and salts. Additional information pertaining to more specific questions on concrete may be addressed to: Portland Cement Association, Dept. Ne, 5420 Old Orchard Road, Skokie, IL, 60077.

Some deicing chemicals are more damaging to concrete surfaces than others. Products such as ammonium nitrate or ammonium sulfate tend to damage concrete more than sodium chloride or calcium chloride.

Improper use of deicing agents may cause injury to plants. Excess salts and fertilization from deicers impede uptake of nutrients. Plants cannot absorb sufficient water even when moisture is plentiful.

Symptoms of salt injury include desiccation, stunting and dieback. Leaf tips and margins appear burned. Roots may be injured.

Plants may be protected from injury by direct exposure to salt spray by covering them with burlap or saran cloth to decrease the amount of exposure to slush during snow removal. Accumulation of salt in the soil over several years may cause progressive decline and eventual death of plants. Where deicing agents are

used, flushing the soil with large amounts of water after the last freeze may alleviate burn potential. Always read and follow label directions when using any product, including deicers.

The following tables show arial salt spray (or *topical* salt tolerance) of landscape trees and shrubs.

For soil salt tolerance ratings, see designation after plant name:
(S)- Sensitive, (I) - Intermediate, (T) - Tolerant

Deciduous Trees

Sensitive	Intermediate	Tolerant
Carpinus caroliniana (S) American Hornbean	*Acer ginnala* Amur Maple	*Acer platanoides* (I) Norway Maple
Celtis occidentalis Hackberry	*A. negundo* (I) Boxelder	*A. saccharinum* (I) Silver Maple
Cercis canadenis (I) Eastern Redbud	*A. rubrum* (S) Red Maple	*Aesculus hippocastanum* (T) European Horsechestnut
Crataequs spp. Hawthorn	*A. saccharum* (S) Sugar Maple	*Allanthus altissima* (T) Tree-of-Heaven
Fagus grandifolia (S) American Beech	*Alnus* spp. (S) Alder	*Elaeagnus angustifolia* (T) Russian olive
Liriodendron tulipfera (S) Tuliptree	*Amelanchier* spp. Serviceberry	*Fraxinus americana* (T) White Ash
Malus spp. (I) Crabapple	*Betula* spp. (I) Birch	*Gleditsia triacanthos* (T) Honeylocust
Prunus serotina (T) Black Cherry	*Catalpa speciosa* Catalpa	*Juglans nigra* (S) Black Walnut
Quercus alba (T) White Oak	*Fraxinus pennsylvanica* Green Ash	*Populus* spp. (I) Poplar
Q. palustris Pin Oak	*Pyrus* spp. Pear	*Robinia pseudoacacia* (T) Black Locust
Q. rubra (T) Red Oak	*Quercus macrocarpa* (T) Bur Oak	*Sorbus decora* Mountain ash
Tilia cordata (S) Littleleaf Linden	*Salix alba tristis* Golden Weeping Willow	
	Tilia americana (S) American Linden	
	Ulmus americana American Elm	

Shrubs

Sensitive	Intermediate	Tolerant
Berberis thunbergii (S) Japanese Barberry	*Alnus rugosa* (S) Speckled Alder	*Caragana arborescens* Siberian Peashrub
Buxus sempervirens (S) Common Box	*Berberis koreana Korean Barberry*	*Euronymus alata* (S) Winged Euonymus
Chaenomeles speciosa Flowering quince	*Forsythia x intermedia* Border Forsythia	*Juniperus chinensis* Pfitzer Juniper
Cornus spp. Dogwood	*Juniperus horizontalis* Creeping Juniper	
Corylus spp. (S) Hazelnut	*J.h. 'Plumosa'* (I) Andora Creeping Juniper	Philadelphia Mock orange
Euonymus europea (S) European Euonymus	*Liqustrum* spp. (I) Privet	*Rhamnus* spp. Buckthorn
Sambucus canadensis American Elder	*Lonicera* spp. (I) Honeysuckle	*Rhus aromatica* Fragrant Sumac
Spiraea spp. Spirea	*Syringa vulgaris* Common Lilac	*R.typhina* Staghorn Sumac
Symphoricarpos orbiculatus Indiancurrant Coralberry	*Viburnum dentatum* (S) Arrowood Viburnum	*Kibes alpinum* Alpine Currant
Viburnum lantana (S) Wayfaringtree Viburnum	*V. lentago* (S) Nannyberry Viburnum	*Rosa rugosa* Rugosa rose
	V. trilobum (S) American Cranberrybush Viburnum	*Symphoricarpos albus* Snowberry
		Syringa reticulata Japanese Tree Lila
		Tamariz ramosissima Five-stamen Tamariz

Coniferous Trees

Sensitive	Intermediate	Tolerant
Abies balsamea (I) Balsam Fir	*Juniperus* spp. Juniper	*Juniper virginiana* Eastern Redcedar
Metasequola glyptostroboides Dawn Redwood	*Picea abies* (S) Norway Spruce	*Larix decidua* (S) European Larch
Picea glauca (I) White Spruce	*Pinus ponderosa* (I) Ponderosa Pine	*Picea pungens* (S) Colorado Spruce
Pinus resinosa Red Pine	*Pseudotsuga menziesil* (S) Douglas fir	*Pinus banksiana* Jack Pine
P. strobus (S) Eastern White Pine		*P. nigra* Austrian Pine
P. sylvestris Scotch Pine		
Taxus spp. Yew		
Thuja occidentalis (I) American Arborvitae		
Tsuga canadensis (S) Canada Hemlock		

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